CREATE Terrorism Modeling System (CTMS) and the Risk Analyst Workbench (RAW)

www.usc.edu/create

Presentation to USC/UK Homeland Security Solutions Conference
September 8, 2005

Randolph W. Hall, Michael Orosz
University of Southern California
System of Tools to Address These Problems

- Portfolio Allocation/Budgeting
- Programmatic Investments and Policies
- Targeted Investments
- Acting on Intelligence

System of Tools and Methods, Adaptable to All Risks
CREATE Terrorism Modeling System (CTMS)

1. Structured problem characterization
2. Staircase model of terrorism intervention
3. Four-step modeling system
4. Terrorism Magnitude Scale
5. Integrated family of software tools
1. Structured Characterization: Framing the Question

A. Threat
B. Terrorism outcomes
C. Counter-measures
D. Correspondence of counter-measures to threats
2. Staircase Model of Intervention

- **Desire to Harm America?**
- **Terrorist Preparation Step**
  - **Intervention**
  - **Political Outcomes** (policy change, state support, public reaction, elicitation of support or opposition)
3. Four-Step Modeling System

- Risk Analysis
- Consequence Assessment
- Emergency Response Models
- Economic Assessment

Decision Analyses of Countermeasures
4. Event Magnitude Scale

- Enable order of magnitude comparisons
- Consider three key attributes: human, financial, symbolic
- Provide familiar reference point
- Solution: base 10 logarithmic scale, with maximum of 8
- New Orleans, WTC both likely a level 6 event by the scale
5. Integrated Software Tool: Risk Analyst Workbench (RAW/ISI)

1. Structured Problem Formulation
2. Guided Assessment of Threat Magnitude (scaling for each attribute)
3. Association of Counter-Measures with Threats – Guided Solution Generation
4. Ability to Call Analytical Tools or Data Sets to Support Analysis
5. Forced Consideration of Options and Outcomes
Risk Analyst Workbench (RAW): Features

- Distributed software environment
- Integration of risk assessment models, presentation tools, and data
- Collaborative decision environment
- Standardize scenario definition
- Built-in redundancy
- Secure dissemination of results
- Real-time data monitoring
- “What-if” support
Risk Analysis Workbench

RAW Restricted Access Network (FOUO)

RAW Non-Sensitive Network

External Data/Models/Tools (Sensitive)
FAZD RAW Server (Sensitive)
CREATE RAW Server (Sensitive)

External Data/Models/Tools (Non-Sensitive)
FAZD RAW Server (Non-Sensitive)
CREATE RAW Server (Non-Sensitive)

Non-Secure Local Store
Secure Local Store
Multiple RAW Workstations
CREATE
Center for Risk and Economic Analysis of Terrorism Events

Problem Selection

User Authentication
Username: Joe Doe
Password: ****************
RAW Network Ops:
- On-line
- Off-line

User Can Specify On or Off-line

Current Session Status
Analyst: Joe Doe
RAW Network: On-line
Security Level: Open

User Can Specify Type of Problem
- Portfolio Allocation
- Programmatic Investments and Policies
- Targeted Investments
- Acting on Intelligence
- Last Project: MANPADs - LAX

User Can Open Previous Problem

Access to Multiple Tools and Functions
Scenario Definition

The Process: Scenario Definition Flow

1. Define Target
2. Define Weapon
3. Define Adversaries
4. Define Counter-Measure (if used)
5. Define Consequence (if used)

**Scenario Name:** MANPAD CACE 13

**Text Description (Narrative):**
Determine probability and consequences of a successful MANPAD attack against a commercial jetliner near a major airport.

**Target:**
- **Location:** Dallas/Ft Worth
- **Coordinates:** 34N - 120W

**Weapon:**
- **Type:** SA-7
- **Location:** Inside fence parameter

**Adversaries:**
- **Number:** 3
- **Name:**
  - Suspect 1: Houston, Leader, Iraqi military
  - Suspect 2: Waco, Trigger, Al Qaeda training
  - Suspect 3: Waco, Protection, Unknown

**Counter-Measures:**
- **Type:**
  - Flares
  - Chaff
- **Location:** Aircraft
- **When Deployed:** One second after detection
- **Costs:**
  - $1M/Aircraft
  - $750K/Aircraft

**Consequence:**
- **Part of Scenario:**
  - Aircraft brought down
  - Aircraft damaged - forced to land

**SAVE**

User: Joe Doe
RAW Network: On-line
Security: Open

Access to Multiple Tools and Functions
Scenario Definition Process
Current Session Status
Detailed Specifications

**Weapon Specification**

**Weapon System: 50 Cal Rifle**

**Clasification**
- Nature of Damage: Aircraft penetration
- Likelihood of Lethality/Morbidity: Low

**Proliferation**
- User can purchase

**History of occurrence in domain**
- Airport: Low

**Portability**
- High

**Versatility**
- Targets:
  - Railroads: Penetration/loss of life Medium
  - Automobiles: Penetration/loss of life Low
  - Sniper: Loss of life Low

**Sophistication**
- Training: Low
- Number of crew: 1

**Estimate of Impact from Weapon**

**Estimate, Likelihood Adversary Has Weapon**

**Weapon Specification is Possible Byproduct**

**Scenario Name:** MANPAD CACE 13

**Text Description (Narrative):**
Determine probability and consequences of a successful MANPAD attack against an commercial jetliner near a major airport.

**Target**
- Location: Dallas/Ft Worth
- Coordinates: 34N - 120W

**Weapon**
- Type: 50 Cal Rifle

**Adversaries**
- Number 3

**Counter-Measures**

**Consequence**
- Part of Scenario: Aircraft brought down
- Aircraft damaged - forced to land

**User:** Joe Doe

**Network:** On-line

**Security:** Open
Spatial Data

User selects target location via CREATE GIS interface
“What-if” Analysis

FAZD Decision Support Software – “What-if” Analysis

BASELINE: What-if #2

Acres of Carcass Disposal
Government Control Costs
Measurement Objective #3

25%
5%
20%
35%
15%

Measurement Objective Adjustments (Impacts “Current Run”)

Overall Effectiveness

Current Run: What-if #4

What-if Runs: Drag icon to either “Current Run” or “Baseline”

Sliders: Adjust Parameters

Previous “What-if” Runs

“What-if” Comparisons

Mitigation Options

Vaccinations
Mass Slaughter
Quarantine
Option #4
Option #5

Options

Save-As
Save

LAN: On-Line
User: MikeOrosz
Cross Center Collaboration – FAZD Center

- National Center for Foreign Animal and Zoonotic Diseases Defense (FAZD)
- Under contract with Texas A&M FAZD to extend
  - To aid in FAZD risk analysis
    - Develop decision-support tools
    - Enhanced risk modeling software
  - To promote collaboration with CREATE
- First opportunity to foster cross-center collaboration
- Preliminary design completed in August
Status

- CREATE Requirements and detailed system design completed
  - User Interface (UI) mock-ups
- CREATE RAW prototype software development started
- Preliminary FAZD requirements and system design completed